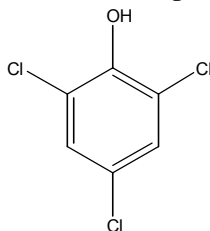


2,4,6-TRICHLOROPHENOL

CAS No. 88-06-2

First listed in the *Third Annual Report on Carcinogens*



CARCINOGENICITY

2,4,6-Trichlorophenol is *reasonably anticipated to be a human carcinogen* based on limited evidence for the carcinogenicity of chlorophenols, including 2,4,6-trichlorophenol, in humans and sufficient evidence for the carcinogenicity in experimental animals. Four cohort studies of men involved in the manufacture of trichlorophenols indicated a relationship between exposure to chlorophenols and the incidences of soft tissue sarcomas and lymphomas. None of these studies distinguished exposure to 2,4,6-trichlorophenol from exposure to tetrachlorodibenzo-*p*-dioxin (TCDD) or other related and unrelated chemicals in the work environment with any certainty (see 2,3,7,8-tetrachlorodibenzo-*p*-dioxin, Section III.B) (IARC S.4, 1982; IARC S.7, 1987).

When administered in the diet, 2,4,6-trichlorophenol increased the incidences of leukemias or lymphomas in male rats and hepatocellular carcinomas and adenomas in mice of both sexes (NCI 155, 1979).

PROPERTIES

2,4,6-Trichlorophenol occurs as yellow to pinkish orange flakes or colorless needles, with a strong phenolic odor. It is soluble in water, acetone, benzene, carbon tetrachloride, diacetone alcohol, diethyl ether, denatured ethanol, methanol, pine oil, Stoddard solvent, toluene, and turpentine. In the United States, 2,4,6-trichlorophenol is available in aqueous formulations that may contain 1,3,6,8-TCDD; 2,3,7-trichlorodibenzo-*p*-dioxin; tri-, tetra-, and pentachlorodimethoxy-dibenzofurans; and tetra-, penta-, and hexachloro-dibenzofurans as impurities. When heated to decomposition, 2,4,6-trichlorophenol emits toxic fumes of hydrochloric acid and other chlorinated compounds.

USE

2,4,6-Trichlorophenol has been used primarily as a wood preservative, glue preservative, and antimildew treatment for textiles. The chemical has been used as a bactericide, insecticide, and defoliant (Sax, 1987). It can be used to prepare the fungicides chloranil, pentachlorophenol, and 2,3,4,6-tetrachlorophenol (IARC V.20, 1979). It has also been used in chemiluminescence reactions to prepare oxalate esters (Kirk-Othmer V.5, 1979).

PRODUCTION

The 1982 Directory of Chemical Producers identified two U.S. producers of 2,4,6-trichlorophenol; however, there is no evidence of current commercial production in the United States (SRIa, 1983; SRI, 1986). Production of 2,4,6-trichlorophenol was not reported to the USITC from 1977 to 1986, but imports through principal U.S. customs districts totaled 550 lb in 1980 and 500 lb in 1978. The 1979 TSCA Inventory identified two companies producing 55,000 lb of 2,4,6-trichlorophenol and two companies importing 55,000 lb in 1977 (TSCA, 1979). In 1976, 2,200 lb of 2,4,6-trichlorophenol were imported (IARC V.20, 1979). No other data on imports or exports were available. In 1975, production of the compound was limited because of the high cost of removing toxic chlorinated dibenzo-*p*-dioxins occurring as impurities in samples of 2,4,6-trichlorophenol. Commercial production of 2,4,6-trichlorophenol in the United States was first reported in 1950 (IARC V.20, 1979).

EXPOSURE

The primary routes of potential human exposure to 2,4,6-trichlorophenol are inhalation and dermal contact. In soil it will biodegrade or adsorb with organic matter in soil. In water it will biodegrade, photolyze and adsorb to sediments. In atmosphere it will react with photochemically produced hydroxyl radicals. The risk of potential occupational exposure to 2,4,6-trichlorophenol is greatest for workers involved in wood preservation and textile treatment. The National Occupational Exposure Survey (1981-1988) indicated that 851 total workers, including 187 women, were potentially exposed to 2,4,6-trichlorophenol in the workplace (NIOSH, 1984). The National Occupational Hazard Survey, conducted by NIOSH from 1972 to 1974, estimated that 110 workers were possibly exposed to 2,4,6-trichlorophenol in the workplace. Worker exposure was primarily in hospitals and in the leather tanning and finishing industry (NIOSH, 1976). According to NCI, substantial potential exposure of the population is questionable; however, residues may be present throughout the environment since it has been used as a pesticide. The compound has been detected in trout exposed to pesticide run-off. 2,4,6-Trichlorophenol was detected at a median concentration of $0.3 \mu\text{g}/\text{m}^3$ in the US (HSDB, 1998). General population may be exposed to 2,4,6-trichlorophenol through ingestion of contaminated water sources. (HSDB, 1998). Workers in Finnish sawmill had a detectable urinary level of 2,4,6-trichlorophenol of 1-11.8 $\mu\text{mol}/\text{L}$ (HSDB, 1998).

2,4,6-Trichlorophenol can form if industrial wastewater containing phenol or certain aromatic acids is treated with hypochlorite. Investigators have detected trichlorophenol (unspecified isomers) in river water samples, landfill leachate samples (40 $\mu\text{g}/\text{l}$), chemical plant effluent water samples, sewage treatment plant effluent samples, finished drinking water samples, and tap water samples (2-4 ng/l). Production emissions have been estimated to be 1 lb/ton (IARC V.20, 1979). The Toxic Chemical Release Inventory (EPA) listed one industrial facility that produced, processed, or otherwise used 2,4,6-trichlorophenol in 1996 (TRI, 1999). In compliance with the Community Right-to-Know Program, the facility reported releases of 2,4,6-trichlorophenol to the environment which were estimated to total 319 lb. Additional exposure information may be found in the ATSDR Toxicological Profile for 2,4,6-Trichlorophenol (ATSDR, 1990e).

REGULATIONS

EPA regulates 2,4,6-trichlorophenol under the Clean Water Act (CWA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and Resource Conservation and Recovery Act (RCRA). EPA published a water quality criteria document on 2,4,6-trichlorophenol for the protection of human health. Under CWA and CERCLA, a reportable quantity (RQ) of 10 lb has been established. Under RCRA, 2,4,6-trichlorophenol is subject to report/recordkeeping requirements as a hazardous constituent of waste. 2,4,6-Trichlorophenol is also subject to permitting and pretreatment regulations for discharges of the compound. OSHA regulates 2,4,6-trichlorophenol under the Hazard Communication Standard and as a chemical hazard in laboratories. Regulations are summarized in Volume II, Table B-146.